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BIRD MORTALITY AND INSECT CONTROL WHEN USING FURADAN ON CATAWBA TIMBER COMPANY'S IRRIGATED PINE SEED ORCHARD, CATAWBA, S. C.

U. S. Forest Service
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U. S. DEPARTMENT OF AGRICULTURE -- FOREST SERVICE
SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
RESOURCE PROTECTION UNIT, FOREST INSECT AND DISEASE MANAGEMENT GROUP

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BIRD MORTALITY AND INSECT CONTROL WHEN USING FURADAN ON CATAWBA TIMBER COMPANY'S IRRIGATED PINE SEED ORCHARD, CATAWBA, S. C.

by

G. D. Hertel[1/] and L. R. Barber[2/]

INTRODUCTION

In the fall of 1976 Furadan® (carbofuran) 10 G granules was registered for use against coneworms, seedbugs, coneborers, and cone beetles This registration came about through a 1974 and 1975 southwide test conducted in 30 seed orchards and coordinated by the Southern Seed Orchard Pest Committee[3/] (DeBarr 1976, 1978). Furadan was applied to individual trees by hand-held devices and incorporated into the soil using a rake or disk. An important problem not dealt with was how Furadan would be operationally incorporated into the soil.

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3/ This committee is made up of nine representatives: one each from the three southern seed orchard cooperatives, one from states not represented by a cooperative, one from TVA, one representing the universities, one from the Southeastern Forest Experiment Station, USFS, one from State & Private Forestry, USFS, and one from the National Forest System, USFS.

In February 1976, Forest Insect and Disease Management, in cooperation with the Southern Seed Orchard Pest Committee, operationally tested the Zip Seeder® and the disk method for incorporation of Furadan granules (4 to 8 oz/in tree diameter) in three pine seed orchards in Mississippi, Georgia, and Virginia (Barber 1978). Both methods failed to adequately incorporate the granules and excessive bird mortality occurred in the Mississippi and Georgia tests. No bird mortality occurred in the Virginia orchard, probably because of the lack of migrating birds at the time of application. While Furadan applied by either method prevented insect related seed losses, these techniques cannot be recommended for use because the potential for bird mortality might jeopardize the registration.

In 1977, Forest Insect and Disease Management tested the John Deere Powr-Till® Seeder as a Furadan applicator in four orchards located in Louisiana (Continental Forest Industries), Mississippi (National Forests - Erambert), Florida (Buckeye Cellulose Corp.), and South Carolina (International Paper Co.). Incorporation of the Furadan exceeded 99 percent on all orchards. Avian mortality never exceeded 45 for any 30-acre treatment block over a 7-day period. Excellent insect control was achieved (Barber et al. 1978).

During 1977, interest was shown by the North Carolina Cooperative and FMC in evaluating incorporation of Furadan granules by using irrigation systems. Because of this interest, State and Private Forestry agreed to evaluate this method at the Catawba Seed Orchard in Catawba, South Carolina, in the winter of 1977. This was the first year Furadan was applied operationally at this orchard.

OBJECTIVES

The objectives of this evaluation were:

1. Can Furadan be broadcast and watered in without significant bird mortality taking place, and
2. Can Furadan be applied at a registered dosage rate using this technique and provide seed and cone insect control.

METHODS

I. Furadan Application and Avian Mortality

The 20-acre Catawba loblolly pine (Pinus taeda L.) Seed Orchard is located in Catawba, S.C. Seventeen acres were treated on February 8 and 9, 1977, with Furadan 10 G and three acres were left untreated. Twenty-eight hundred and twelve kg (6200 lbs) of Furadan were applied in a 2.4 m (8') band on two sides of the tree from a Ford Fertilizer Spreader (Fig. 1) at the rate of .009 kg/mm (8 oz in tree diameter). A total of 25.4 mm (1") of rain was deposited from the sprinkler system on February 8, 9, and 10 (Fig. 2).

Figure 1. Ford fertilizer spreader used to apply Furadan on the Catawba Timber Co. pine seed orchard in Catawba S.C. February 1977.

Figure 2. Irrigation system in operation on the Catawba Seed Orchard in Catawba, S. C.

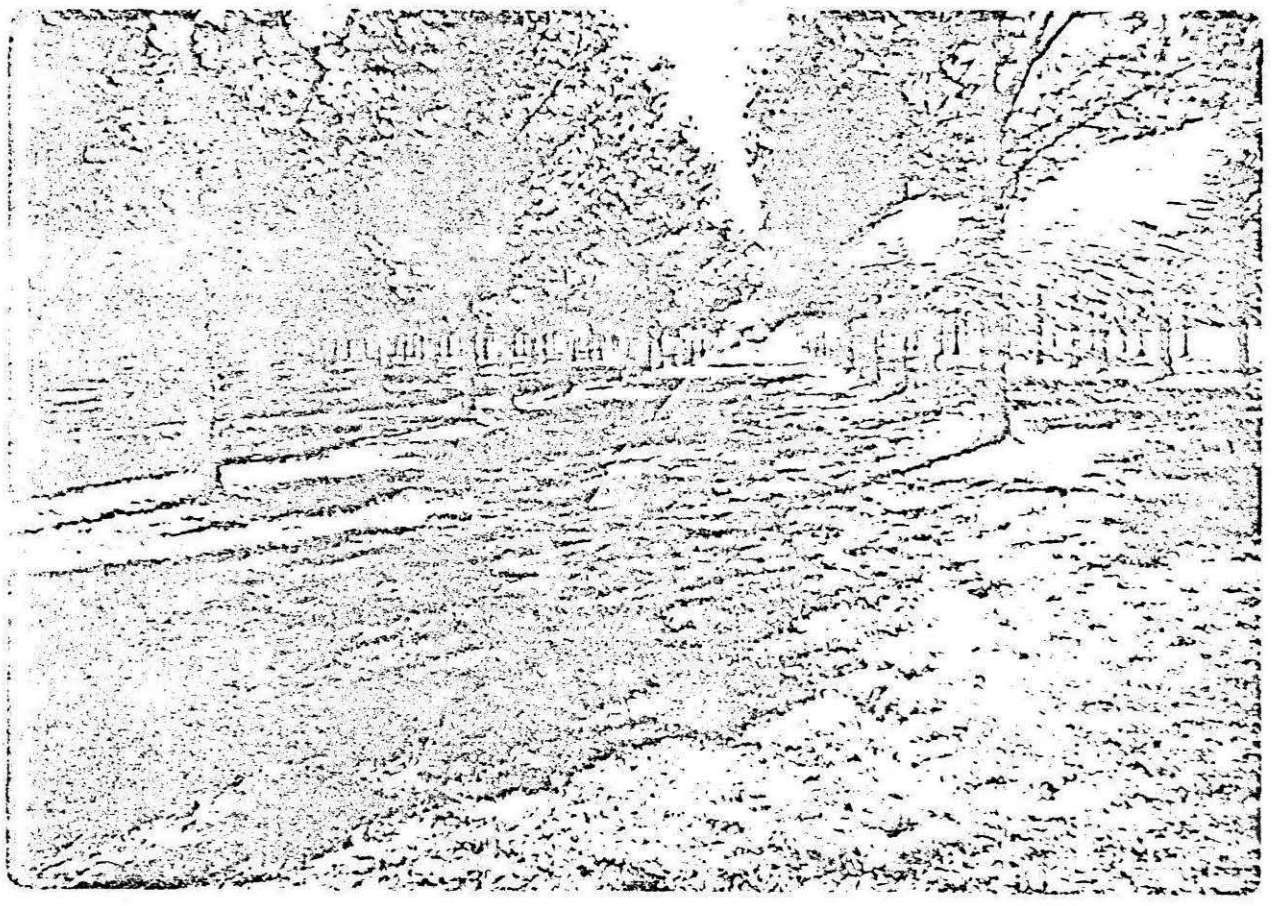

Figure 2. Irrigation system in operation on the Catawba Seed Orchard in Catawba, S. C.

At 1 day prior to and 1, 2, 3, and 5 days after application of Furadan, crews walked up and down the rows in the treated orchard to locate dead birds. The efficiency of the search was determined by seeding 50 dead birds throughout the orchard. The location of these birds was known only by the wildlife specialist assigned to the project. All edges (30 m from the orchard boundary) of the treated area were searched for dead birds. At weekly intervals for the next three weeks, crews searched the treated orchard for dead birds. No seeded birds were used for these searches. The digestive system from a sample of dead birds was searched for Furadan granules.

Eight of the seventeen acres treated with Furadan were sprayed with Guthion 2S on May 17, June 30, August 19, and September 22.

II. Seed and Cone Insect Control

Four clones were selected for study with each represented by four ramets. Two ramets of each clone were located in each treated (Furadan, Furadan and Guthion) area and two ramets in the untreated area.

At cone harvest, all cones were counted and the percent attacked by coneworms determined. Five apparently healthy cones from each each ramet were bagged and sent to the Eastern Tree Seed Laboratory for SOSET. The radiographs were returned to Forest Insect and Disease Management for interpretation and final analysis.

A randomized block design was used for the evaluation and the data were analyzed by analysis of variance and Duncan's Multiple Range Test where two factors, treatments and clones, were crossed and the third factor, ramets, was nested in the clones.

The following response variables were analyzed as above:

1. Percent healthy cones
2. Percent coneworm-damaged cones
3. Percent other damage
4. Percent 2 + 3
5. Percent seedbug-damaged seed
6. Percent empty seed
7. Percent full seed

RESULTS AND DISCUSSION

No mechanical problems developed while Furadan was being applied. One breakdown in the irrigation system required workers to make repairs in standing water. As the irrigation system is in a 3.6 - 4.2 m (12 - 14 ft) wide zone where no Furadan was applied, we did not expect any Furadan to be present in the water. However, rubber boots and gloves were worn to prevent exposure.

Bird Mortality

Some Furadan granules were left exposed on the ground surface (Fig. 3), and we expected dead birds. Fortunately, few dead birds were found (Table 1). However, bird activity was light as compared

Figure 3. Furadan granules left exposed on sycamore leaves in the Catawba Seed Orchard in Catawba, S.C., February 1977.

Table 1. Avian mortality and searching efficiency on the Catawba irrigated pine seed orchard, Catawba, SC, treated with Furadan on February 8 - 9, 1977.

	Days after application					
	-1	+1	2	3	5	TOTAL
Bird mortality	1	7	8	4	4	24
% efficiency	-	78	86	94	-	87

to other orchards tested in the John Deere Powr-Till Seeder pilot test. Of course, this would be the best time to apply Furadan.

One wren, one dove, two blue jays, four sparrows, five juncos, five robins, and six purple finches were found dead within 5 days after Furadan application. On February 21, one unidentified bird, two juncos, and four robins were found dead. On February 28, two unidentified birds, one dove and one junco, were found dead. No additional bird mortality occurred after this date. Of the 16 birds dissected, eight contained Furadan granules. Cardinals and piliated woodpeckers were often seen utilizing the seed orchard. However, no loss or sickness was observed.

Scavenger activity did occur. Nineteen of 50 seeded birds were lost to scavengers. Opossums, racoons, a dog, and two birds of prey were sighted. This would indicate that some of the Furadan-killed birds were scavenged. The fate of the scavengers is unknown.

Insect Control

Coneworm, Dioryctria spp., control on cones was provided by Furadan alone and Furadan plus Guthion (table 2). Both treatments were significantly better than the untreated check, but were not different from each other. In this instance, Guthion provided no additional control. The total numbers of cones (healthy, coneworm, and damaged) and healthy cones per ramet did not differ among the three treatments.

Table 2. Cone and seed damage to loblolly pines treated with Furadan and Guthion on Catawba Timber Company Seed Orchard in South Carolina.

	Mean Percent		
	Check	Furadan Only	Furadan & Guthion
CONES			
Healthy	89.6a	95.4b	94.5b
Coneworm	5.9a	0.6b	0.9b
Other damage	4.5a	4.0a	4.1a
Coneworm and Other	10.4a	4.6b	5.5b
SEEDS[1/]			
Seedbug	3.7a	2.8a	0.9a
Empty	27.5a	26.2a	24.6a
Full	68.8a	71.0a	74.5a

1/ Percents based on a seed lot of 100 seeds.

There were no differences among treatments for any of the seed catagories (Table 2). We would, however, expect differences in these catagories after the second year of Furadan use. The first year abortions should be lower in the Furadan use. The first year abortions should be lower in the Furadan treated areas, giving us an increase yield in full seed.

RECOMMENDATIONS

Additional evaluations will be needed before the U. S. Forest Service can recommend Furadan application via broadcast plus sprinkle irrigation. The primary reason is that the Furadan label now reads that the insecticide be incorporated into the soil and a label change would be necessary before irrigation might be considered a suitable device.[4/] Several additional evaluations would be needed under varying geographic and climatic conditions to expand the label.[4/] This method would also have to be tested where bird populations were higher.

We would not consider the bird mortality excessive. For instance, the few robins lost would have little impact on the overall population. However, we recognize that one endangered species dead could be significant, and because of this, we should always strive for no bird mortality.

4/ Personal communication, (Mrs.) S. J. Wendler, FMC Corporation, July 6, 1977.

We would suggest that the orchard take the following steps to reduce bird losses this year.[5/]

1. Scaring devices should be used for 5 days after application.
2. An area on the edge of the orchard or nearby should be disked to lure birds from the treated orchard.
3. One portion of the orchard contained many sycamore leaves on the ground. The accumulation of granules on these leaves could be prevented by dragging the orchard with a light drag harrow immediately after Furadan application.
4. Apply when bird populations are low.

Forest Insect and Disease Management will contact the three Seed Orchard Cooperatives for possible sites of additional tests using irrigation as the method of Furadan incorporation.

5/ This year's application should also be considered an evaluation to obtain data for a label change.

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